

### **REMARKS**

This is a full and timely response to the outstanding Final Office Action mailed May 13, 2005, which accompanies the filing of an RCE application. In this amendment, claims 38 and 49 have been amended, claims 53-54 have been cancelled, and claim 57 has been added. Claims 39-48, 50-52, and 55-56 remain in this application.

Applicants have amended claim 38 to more clearly identify a novel and non-obvious feature of the claimed invention. Specifically, the claim is amended to add the limitation of: "wherein the pattern of the slots comprises a pattern selected from the group consisting of: circular pattern, a radiating pattern, a rectangular pattern, a concentric circular pattern, or a concentric octagonal pattern." Support for this added language can be found at least on page 8, lines 8-13 and Fig. 3A-3G of the application. Accordingly, Applicants submit that no new matter is added to the application by this amendment. Applicants have also amended claim 49 as suggested by the Examiner.

Applicants have added new claim 57 to more clearly identify a novel and non-obvious feature of the claimed invention. Specifically, the new claim 57 recites the limitations claimed in previously amended claim 38 and the original claim 50. Accordingly, no new matter is added by the addition of this new claim.

Applicants respectively request that a timely Notice of Allowance be issued in this case.

### **Discussion of Rejections under 35 U.S.C. 102**

Claims 38, 49-50 and 53-54 were tentatively rejected under 35 U. S. C. 102(b) as allegedly anticipated by *Shishido* et al. (US 6,294,831). In this regard, *Shishido* et al. allegedly teaches a package with a thermally conductive structure. Specifically, the thermally conductive

structure (heat spreader) 46 has a pattern of openings 48 not piercing the thermally conductive structure. (See Fig. 5(a)). Further, the pattern of openings 48 is shown beyond the outer closed dot line in Fig. 5(a).

With respect to claim 38, as amended claim 38 recites:

38. A ball grid array package, comprising:  
a semiconductor chip/die affixed to a ball grid substrate; the ball grid substrate having a series of balls; and  
a heat spreader mounted to the semiconductor chip/die and the ball grid substrate opposite the series of balls; the heat spreader having a pattern of slots, not completely piercing the heat spreader, therein, *wherein the pattern of the slots comprises a pattern selected from the group consisting of: circular pattern, a radiating pattern, a rectangular pattern, a concentric circular pattern, or a concentric octagonal pattern.*

*(Emphasis Added).*

Applicants respectfully assert that the cited art is deficient for the purpose of anticipating claim 38. In particular, Applicants respectfully assert that that cited art does not teach or otherwise disclose at least the limitations emphasized above in claim 38.

Applicants respectfully assert that this limitation, *i.e.* the pattern of the slots comprising either a circular pattern, a radiating pattern, a rectangular pattern, a concentric circular pattern, or a concentric octagonal pattern. Use of such a feature is not taught or reasonably suggested by any or a combination of the cited references. Therefore, Applicants respectfully assert that claim 38 is in condition for allowance.

As claims 39 – 52 and 55 - 56 are dependent claims that incorporate the limitations of claim 38, Applicants respectfully assert that these claims also are in condition for allowance. Additionally, these claims recite other limitations that can serve as an independent basis for patentability.

With respect to new claim 57, that claim recites:

57. A ball grid array package, comprising:  
a semiconductor chip/die affixed to a ball grid substrate; the ball grid substrate having a series of balls; and  
a heat spreader mounted to the semiconductor chip/die and the ball grid substrate opposite the series of balls; the heat spreader having a pattern of slots, not completely piercing the heat spreader, therein, *wherein the slots penetrate the heat spreader from about 50 to 75%.*

(*Emphasis Added*).

*Shishido et al.* teach a package with a thermally conductive structure. Specifically, the thermally conductive structure (heat spreader) 46 has a pattern of openings 48 not piercing the thermally conductive structure. (See Fig. 5(a)). Further, the cover Fig. and Fig. 5(a) of *Shishido et al.* (both US 6,294,831 and 6,562,662) show the openings 48 penetrate the thermally conductive structure (heat spreader) 46 by an amount **less than 50%**. Further, *Dordi* teaches a tape ball grid array package with a preformed metal stiffener. Specifically, the stiffener (heat spreader) 34 has a pattern of vent holes or openings 40 completely piercing the stiffener. (See Fig. 3).

Applicants respectfully assert that this limitation, *i.e.* the slots penetrate the heat spreader from about 50 to 75%, clearly defines claim 57 over the cited art of record. Use of such a feature is not taught or reasonably suggested by any or a combination of the cited references. Therefore, Applicants respectfully assert that claim 38 is in condition for allowance.

#### Cited Art of Record

The cited art of record has been considered, but is not believed to affect the patentability of the presently pending claims.

**CONCLUSION**

In light of the foregoing amendments and for at least the reasons set forth above, Applicant respectfully submits that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

The filing fee for the accompanying RCE application is authorized via an enclosed credit card authorization form. No additional fee is believed to be due in connection with this Amendment and Response with RCE. If, however, any additional fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,

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